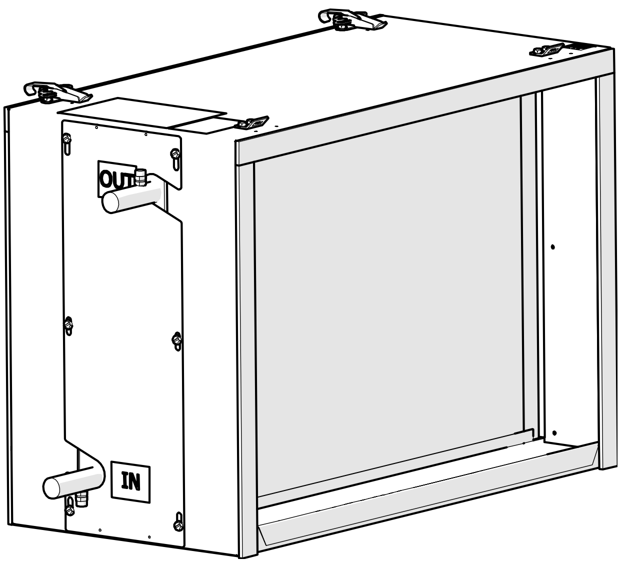
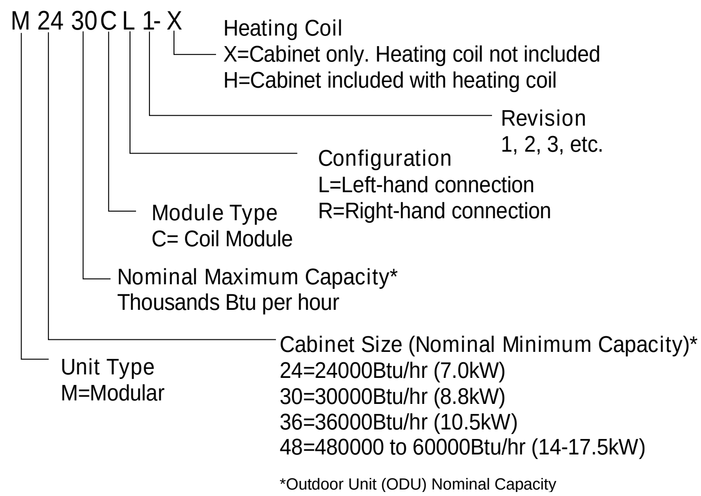
M Series Heating Module
Engineering Specifications



Model Number Key



PACKING LIST

Carton contains:

- (1) – Cabinet
- (1) – Hook Flange
- (2) – Latch keepers
- (2) – Latches
- (1) – Hot water heating coil *(Optional)*
- (4) – Screws
- (1) – Gasketing
- (1) – Bulletin 20.020.4
- (1) – Bulletin 30-030

APPLICATIONS

Unico System designed and built heating units can be easily installed with the matching blower and cooling modules. For matchups, see Table 1. The heating module can be matched to a blower module for a heating only system or it can be matched with both a blower and a cooling module for a system that heats and cools. The slide-in hot water/glycol heating coil is supplied separately. If potable water is used, refer to TechNote 112 for disinfection procedures. A typical horizontal installation is shown in Figure 1.

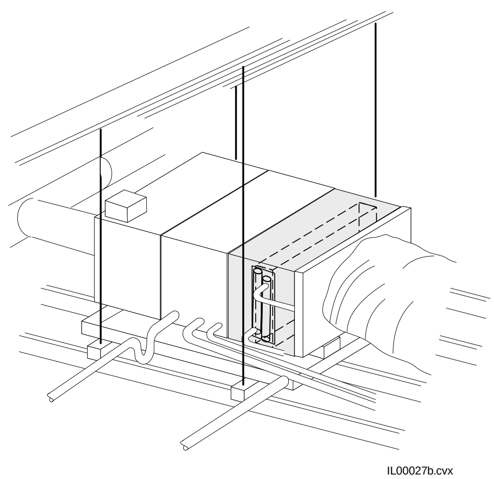


Figure 1. Typical LH horizontal installation with Unico System blower module and cooling module.

Table 1. Compatible Modules.

Heating Module Cabinet	Matching Unit
	Blower Module
M2430CL1-X/H M2430CR1-X/H	M2430BL1 M2430BR1
M3036CL1-X/H M3036CR1-X/H	M3036BL1 M3036BR1
M3642CL1-X/H M3642CR1-X/H	M3642BL1 M3642BR1
M4860CL1-X/H M4860CR1-X/H	M4860BL1 M4860BR1

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CABINET CONSTRUCTION

The cabinet is constructed of 22 gauge (0.030 in, 0.76 mm) galvanized steel with removable access panels on both sides for ease of service. All access panels are secured with slotted hex head washer screws and hardened steel U-clip nuts to prevent stripping. The cabinet is fully lined with closed cell insulation. Easy snap latches are included for quick field assembly with the matching modules. See dimensional drawing for additional information.

COIL CONSTRUCTION

Unico designed and fabricated hot water coils are constructed of evenly spaced corrugated aluminum fins mechanically bonded to copper tubes. The tubes are ½-in. diameter on staggered centers. Full-collar fins provide greater tube-fin contact for excellent heat transfer. Each coil is pressure tested at the factory. Bleed and drain valves are provided on the headers outside the cabinet. Matching coils are available separately, or with the cabinet.

HEATING MODULE SPECIFICATIONS

Heating Coil Properties	Heating Module Cabinet Model No.	M2430CL1-X/ M2430CR1-X	M3036CL1-X/ M3036CR1-X	M3642CL1-X/ M3642CR1-X, M4860CL1-X/ M4860CR1-X
	Heating Coil Model No.	HW-2430	HW-3036	HW-3642* HW-4860*
	Net Face Area [ft^2, (m^2)]	2.08 (0.19)	2.60 (0.24)	3.43 (0.32)
	Tube Diameter [in., (mm)]	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
	Number of Rows	4	4	4
	Fin Density [fins/in., (fins/m)]	12 (472)	12 (472)	12 (472)
	Water Connection Size, ODF Sweat [in., (mm)]	7/8 (22.2)	7/8 (22.2)	7/8 (22.2)
	Design Pressure [psig, (kPa)]	150 (1034)	150 (1034)	150 (1034)
	Coil Water Volume [gal., (L)]	0.9 (3.4)	1.1 (4.2)	1.37 (5.2)
Coil Dimensions [in, (mm)]	A	24.5 (622)	29.5 (749)	37.5 (953)
Cabinet Dimensions [in, (mm)]	A	25 (635)	30 (762)	38 (965)
	B	23 (584)	28 (711)	36 (914)
Shipping Weight	Cabinet Only [lbs, (kg)]	20 (9.1)	25 (11.3)	28 (12.7)
	Coil Only [lbs, (kg)]	33 (15.0)	45 (20.4)	48 (21.8)

***Note: The 3642CL1-X/M3642CR1-X AND M4860CL1-X/M4860CR1-X are identical parts and interchangeable.**

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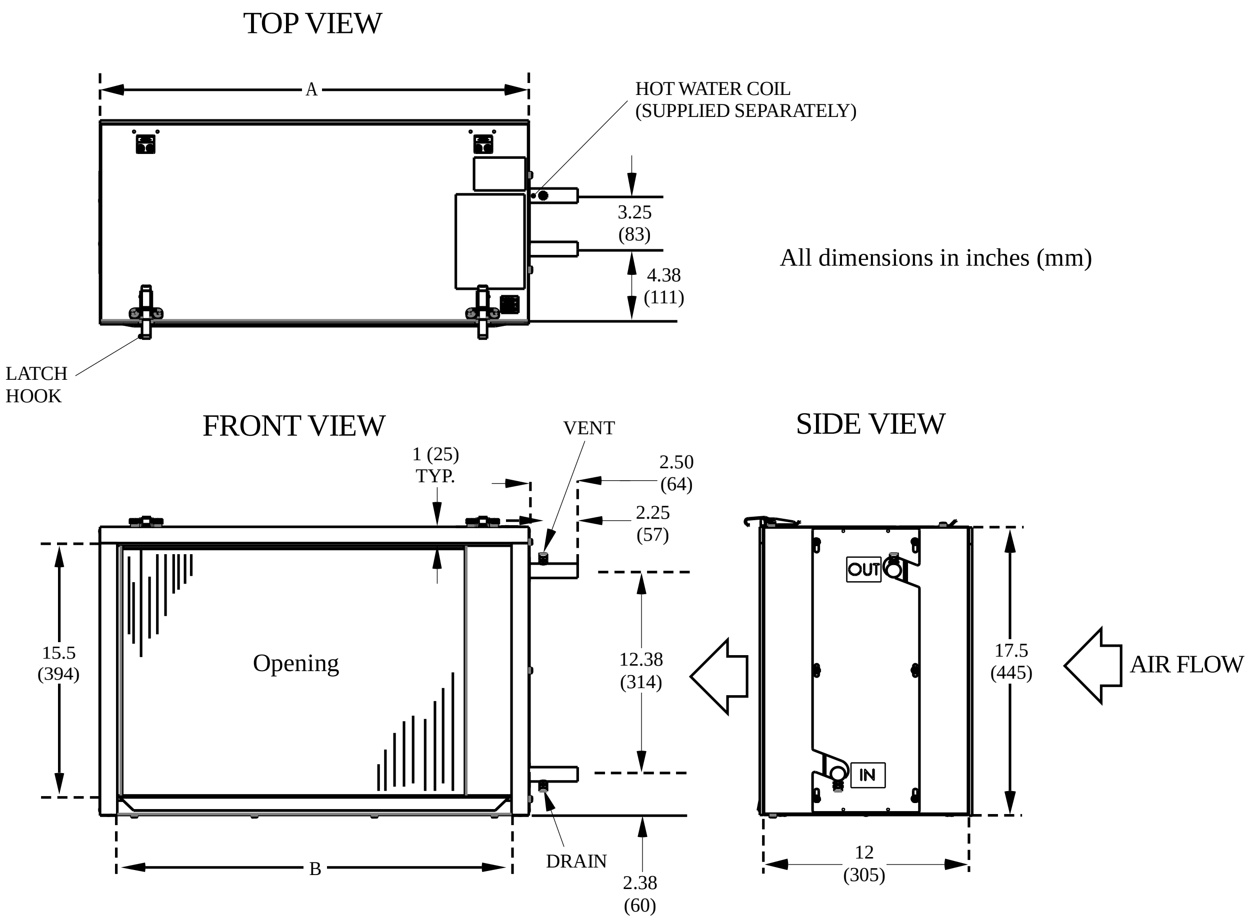
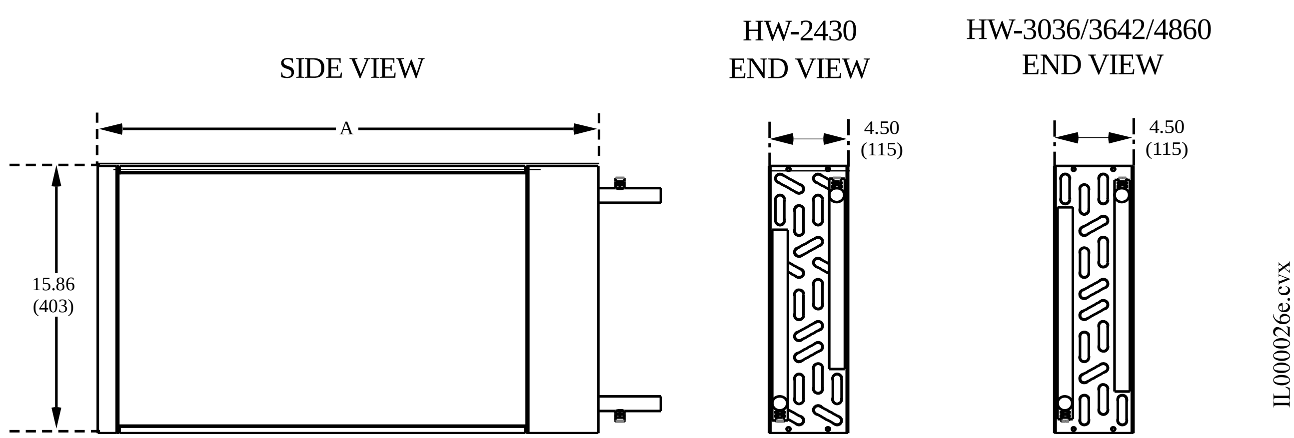
DIMENSIONAL DATA

LH Heating Module Cabinet Dimensions*



*RH heating module cabinet dimensions are the same as the LH cabinet dimensions.

Heating Coil Dimensions



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HOT WATER COIL PERFORMANCE

HW2430				Airflow								Water Pressure Drop	
Entering Water Temp		Water Flow Rate		400CFM (189 L/s)		500CFM (236 L/s)		600CFM (283 L/s)		-			
				Total Capacity									
°F	°C	GPM	L/s	MBH	kW	MBH	kW	MBH	kW	MBH	kW	ft. w.c.	kPa
120	48.9	4	0.25	19.3	5.7	23.0	6.7	26.7	7.8	-	-	4.5	13.5
		6	0.38	19.7	5.8	23.8	7.0	27.7	8.1	-	-	9.7	29.0
		8	0.50	19.9	5.8	24.1	7.1	28.2	8.3	-	-	16.8	50.2
140	60.0	4	0.25	27.1	7.9	32.4	9.5	37.5	11.0	-	-	4.3	12.9
		6	0.38	27.7	8.1	33.4	9.8	38.9	11.4	-	-	9.3	27.8
		8	0.50	27.9	8.2	33.8	9.9	39.5	11.6	-	-	16.1	48.1
160	71.1	4	0.25	34.9	10.2	41.8	12.3	48.4	14.2	-	-	4.1	12.3
		6	0.38	35.6	10.4	43.0	12.6	50.1	14.7	-	-	8.9	26.6
		8	0.50	36	10.6	43.6	12.8	50.9	14.9	-	-	15.4	46.0
Recommended No. of Outlets				12		15		18		-			

HW3036				Airflow								Water Pressure Drop	
Entering Water Temp		Water Flow Rate		500CFM (236 L/s)		600CFM (283 L/s)		700CFM (330 L/s)		800CFM (378 L/s)			
				Total Capacity									
°F	°C	GPM	L/s	MBH	kW	MBH	kW	MBH	kW	MBH	kW	ft. w.c.	kPa
120	48.9	2	0.13	22.0	6.4	25.0	7.3	27.5	8.1	29.8	8.7	2.3	6.9
		4	0.25	22.8	6.7	26.2	7.7	29.2	8.6	32.0	9.4	4.9	14.6
		6	0.38	23.2	6.8	26.8	7.9	30.1	8.8	33.1	9.7	8.4	25.1
		8	0.50	23.4	6.9	27.1	8.0	30.6	9.0	33.7	9.9	12.8	38.2
140	60.0	2	0.13	30.9	9.1	35.1	10.3	38.7	11.4	41.9	12.3	2.3	6.9
		4	0.25	32.0	9.4	36.8	10.8	41.1	12.0	45.0	13.2	4.8	14.3
		6	0.38	32.5	9.5	37.6	11.0	42.2	12.4	46.5	13.6	8.2	24.5
		8	0.50	32.8	9.6	38.1	11.2	42.9	12.6	47.4	13.9	12.5	37.4
160	71.1	2	0.13	39.9	11.7	45.3	13.3	50.0	14.7	54.2	15.9	2.2	6.6
		4	0.25	41.3	12.1	47.5	13.9	53.0	15.5	58.1	17.0	4.7	14.0
		6	0.38	41.9	12.3	48.5	14.2	54.5	16.0	59.9	17.6	8.0	23.9
		8	0.50	42.2	12.4	49.0	14.4	55.3	16.2	61.0	17.9	12.2	36.5
Recommended No. of Outlets				15		18		21		24			

Capacities are based on 70°F (21°C) return air temperature (T_{in})
Conversion Factors: MBH = 1000 Btu/hr, 1 kW = 3413 Btu/hr

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HW3642 HW4860				Airflow								Water Pressure Drop	
Entering Water Temp		Water Flow Rate		600CFM	(283 L/s)	800CFM	(378 L/s)	1000CFM	(472 L/s)	1250CFM	(590 L/s)		
				Total Capacity									
°F	°C	GPM	L/s	MBH	kW	MBH	kW	MBH	kW	MBH	kW	ft. w.c.	kPa
120	48.9	4	0.13	28.8	8.4	35.0	10.3	39.9	11.7	45.0	13.2	2.7	8.1
		6	0.25	30.1	8.8	37.3	10.9	43.4	12.7	49.9	14.6	5.8	17.3
		8	0.38	30.7	9.0	38.5	11.3	45.2	13.2	52.5	15.4	10.0	29.9
		10	0.50	31.0	9.1	39.2	11.5	46.2	13.5	54.1	15.9	15.3	45.7
140	60.0	4	0.13	40.5	11.9	49.3	14.4	56.2	16.5	63.4	18.6	2.6	7.8
		6	0.25	42.2	12.4	52.5	15.4	61.0	17.9	70.2	20.6	5.5	16.4
		8	0.38	43.1	12.6	54.1	15.9	63.4	18.6	73.8	21.6	9.6	28.7
		10	0.50	43.5	12.7	55.0	16.1	64.9	19.0	76.0	22.3	14.6	43.6
160	71.1	4	0.13	52.2	15.3	63.5	18.6	72.5	21.2	81.8	24.0	2.5	7.5
		6	0.25	54.4	15.9	67.6	19.8	78.6	23.0	90.5	26.5	5.3	15.8
		8	0.38	55.4	16.2	69.6	20.4	81.8	24.0	95.2	27.9	9.2	27.5
		10	0.50	56.0	16.4	70.8	20.7	83.6	24.5	98.0	28.7	14.0	41.8
Recommended No. of Outlets				18		24		30		37			

WARNING

TO PREVENT INJURY OR DAMAGE FROM HIGH TEMPERATURES, DO NOT INSTALL FLOOR OUTLETS WHEN OPERATING IN THE SHADED AREA. DISCHARGE TEMPERATURES IN THIS RANGE CAN EXCEED 160°F (71°C)

Coil Air Pressure Drop				
Air Flow Rate		Pressure Drop [in. w.c., (kPa)]		
CFM	m^3/s	HW-2430	HW-3036	HW-3642 HW-4860
400	(0.19)	0.07 (0.017)	0.05 (0.012)	-
500	(0.24)	0.10 (0.025)	0.07 (0.017)	-
600	(0.28)	0.12 (0.030)	0.09 (0.022)	0.06 (0.015)
700	(0.33)	-	0.11 (0.027)	0.08 (0.020)
800	(0.38)	-	0.13 (0.033)	0.09 (0.022)
900	(0.42)	-	0.16 (0.040)	0.11 (0.027)
1000	(0.47)	-	-	0.13 (0.033)
1100	(0.52)	-	-	0.15 (0.037)
1250	(0.59)	-	-	0.18 (0.045)

Note: Evaluated at 70°F db/21°F wb

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EQUATIONS

The general equation for the sensible heat capacity, q, is:

$$q = p\dot{Q}c_p(\Delta T) \qquad (1)$$

Where:

- ρ is density,
- $\dot{Q}$ is the volumetric flow rate,
- c_p is the specific heat capacity constant, and
- ΔT is temperature difference through the coil.

The temperature difference is defined differently depending on whether the fluid is being heated or cooled. It is expressed in the following way:

Heated fluid: $\Delta T = T_{out} - T_{in}$ (2)

Cooled fluid: $\Delta T = T_{in} - T_{out}$ (3)

Where:

- T_{in} is the inlet temperature of the fluid, and
- T_{out} is the outlet temperature of the fluid.

The fluid is either air or water.

Equation (1) can be simplified by assuming standard density and specific heat for the particular fluid. If you are at a high altitude please refer to Tech Note 103, *High Altitude Applications*, for more detailed information about the effects of air density. Otherwise, use the following equations to find the leaving fluid temperature.

For air:

q = 1.08 (CFM) ΔT Btu/hr (ΔT is in °F) (4a)
q = 1.21 (L/s) ΔT Watts (ΔT is in °C) (5a)

For water:

q = 500 (GPM) ΔT Btu/hr (ΔT is in °F) (4b)
q = 4.15 (L/s) ΔT kW (ΔT is in °C) (5b)

Example. Consider a M2430H with 6 GPM (38 L/s) at 140 °F (60 °C) and 600 CFM (280 L/s). The capacity from the table is 38.9 MBH (11.6 kW). Therefore, the leaving air temperature (LAT) is as follows:

$$\text{LAT} = 70 + \frac{38.9 \times 1000}{1.08 \times 600} = 130 \quad °F \qquad (6a)$$

$$\text{LAT} = 21 + \frac{11.4 \times 1000}{1.21 \times 280} = 54.6 \quad °C \qquad (6b)$$

Likewise, determine the Leaving Water Temperature (LWT) by using one of the following equations:

$$\text{LWT} = 140 - \frac{38.9 \times 1000}{500 \times 6} = 127 \quad °F$$

$$\text{LWT} = 60 - \frac{11.4}{4.15 \times .38} = 52.8 \quad °C$$

Certified to UL Standard 1995
Conforms to CAN/CSA Standard C22.2 NO. 236

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